

# Chemistry 2210A Chemistry of the Environment Course Outline

## 1. Course Information

**Course name:** Chemistry of the Environment (2210A)

**Academic term:** Fall (September 2025 – December 2025)

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### List of Prerequisites

Prerequisites: (Chemistry 1301A/B and Chemistry 1302A/B) or (Chemistry 1301A/B and Integrated Science 1001X).

Antirequisites: CEE 2217A/B

Unless you have either the prerequisites for this course or written special permission from the Department of Chemistry to enroll in it, you may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on your academic record. This decision may not be appealed.

## 2. Instructor Information

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██  
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Appointment outside regular office hours can be made by emailing the instructor. Typically, a 30-minute appointment can be arranged within 48 hours upon receiving the email request.

Students must use their Western (@uwo.ca) email addresses when contacting your instructor. Please include your name in your email. If you don't receive a response after 48 hours, please kindly send a follow-up email.

### 3. Course Syllabus, Schedule, Delivery Mode

#### Course Description

Explore the current and future impact of human activity on our environment from a chemistry perspective. Analyze the chemistry behind topics such as the ozone hole, air pollution, climate change, sustainable energy, water and soil chemistry, chemical properties of common pollutants, and the chemistry behind waste management strategies.

#### Learning Outcomes

By the end of this course, students will be able to:

- Explain how human activities affect atmospheric, aquatic, and terrestrial systems, with emphasis on the ozone hole, air quality, climate change, water and soil chemistry.
- Differentiate between natural chemical processes and anthropogenic processes that influence environmental quality.
- Critically analyze and interpret current news articles related to environmental chemistry issues.

For Theme-specific learning outcomes:

#### Theme 1: Atmospheric Chemistry

- Describe the formation and destruction of ozone in the unpolluted atmosphere, and evaluate the role of anthropogenic chemicals in ozone depletion.
- Identify major sources of air pollution, interpret the Air Quality Index (AQI), and justify why specific gas species are monitored.

#### Theme 2: Climate Change and Energy

- Explain the relationship between greenhouse gases and global warming.
- Determine whether a molecule can act as a greenhouse gas based on its molecular structure and spectroscopic characteristics.
- Assess the role of renewable and alternative energy sources (e.g., biofuels, hydrogen, nuclear) in reducing anthropogenic climate impacts.

#### Theme 3: Aquatic Chemistry

- Apply fundamental chemistry concepts to quantify dissolved chemical species in natural waters.
- Explain how dissolved gases, organic matter, and metal ions affect water chemistry.
- Describe standard protocols for water purification and evaluate their effectiveness for safe human consumption.

#### Theme 4: Soil Chemistry and Waste Management

- Summarize the physical and chemical properties of soils and explain their role in mediating water–soil–human interactions.
- Evaluate the chemical properties of selected pollutants (e.g., heavy metals, persistent organics) and their environmental impacts.
- Compare waste management strategies (landfilling, incineration, recycling, bioremediation) in terms of chemical processes and environmental outcomes.

## Anticipated Course Content (subject to revision#)

Themes and anticipated weekly progress	Textbook*		Description
	Baird & Cann	VanLoon	
Theme 1 Week 1-3	1-2	2-3	Photochemical reactions, O <sub>3</sub> formation and destruction, Ozone holes
	3	4,6	Chemical species in Smog and the related reactions Air quality
Theme 2 Week 3-6	5	8	The greenhouse gases and the warming effect
	6-8	8, handout	Fossil fuels and renewable energy sources
Theme 3 Week 7-9	4,10	9,10	Water chemistry and dissolved species
	4,12	11	Chemical reactions in water
	11	16	Water purification
Theme 4 Week 10-12	16, handout	17,18	Soil chemistry, basic properties of soil
	13-15	20	Toxic chemicals in the soil
	16	19	Solid waste management

#Although the themes listed above are the *intended* course content, the instructor reserves the right to deviate from this list should an interesting topic of environmental concern appear in the news.

\*See next section for course materials. Content appears in the lectures are testable. Course readings, unless specified, are not testable.

### Key Sessional Dates

Classes begin: September 5, 2025

Fall Reading Week: November 3 – 9, 2025

Classes end: December 8, 2025

Exam period: December 11 – 22, 2025

## 4. Course Materials

### Textbook

There is no required textbook for this course.

### Suggested textbooks:

The content covered in this course is heavily based on the following two textbooks, which are available (hard copy and digital copy) at the Western Bookstore ([https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2025A&courses%5B0%5D=001\\_UW/CHE2210A](https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2025A&courses%5B0%5D=001_UW/CHE2210A)):

- Environmental Chemistry, 5<sup>th</sup> Edition, by Baird and Cann, Freeman and Company
- Environmental Chemistry, A Global Perspective, 4<sup>th</sup> Edition, by vanLoon and Duffy, Oxford University Press

Both titles are available on Reserve (2-hour loan) through the Western Libraries.

### Lecture notes

- Powerpoint slides used for lectures will be shared with students prior to each class, through OWL Brightspace.
- Reading materials and other learning resources will be posted on OWL Brightspace.

Students are responsible for checking the course OWL site (<https://westernu.brightspace.com/>) regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the [OWL Brightspace Help](#) page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

### Technical Requirements

Computer with internet connection and working microphone is required to successfully complete the “Chemistry in the News” VoiceThread Discussion activity.

## 5. Methods of Evaluation

Your course grade, out of 100, will be calculated as listed below. In order to pass the course, you must achieve a total course grade of 50% or greater, AND receive a grade of 40% or greater on the final exam.

If your final exam grade is less than 40%, your total course grade will be recorded as 45 (regardless of marks received for other evaluated items), or your calculated course grade (all evaluated items added), whichever is lower.

### Grading Scheme and Assessment Dates:

Component	Date	Weight
<b>Chemistry in the News VoiceThread Discussion</b>	Throughout the term Reflection assignment due <b>Friday, November 28, 2025</b>	20%
<b>Weekly Quick Quizzes</b>	Throughout the semester Published every Monday (except reading week), submission due Friday of the week	8%
<b>Group Interview</b>	Arranged throughout the semester	12%
<b>Mid-term Test</b>	Test 1: October 8, 2025 (in class) Test 2: November 10, 2025 (in class)	24%

<b>Final Exam</b>	Scheduled by the Registrar	36%
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### **Use of Generative AI Tools**

Generative AI tools may be used **only** for the *Chemistry in the News* VoiceThread Discussion activity. You are encouraged to use AI to gather ideas and perspectives; however, you are solely responsible for ensuring that all information presented in your submissions (including presentations, comments, and final reports) is accurate and reliable. Any sources, including AI tools, must be properly cited or acknowledged.

### **General information about missed coursework**

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs*, posted on the Academic Calendar:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/academic\\_consideration\\_Sep24.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf),

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult [Accessible Education](#).

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:

[https://registrar.uwo.ca/academics/academic\\_considerations/](https://registrar.uwo.ca/academics/academic_considerations/)

All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the **Final Exam** are excluded from this, and therefore always require formal supporting documentation.

When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

**Detailed description on each evaluation category is listed below (including evaluation scheme for missed assessments):**

- ❖ **Chemistry in the News VoiceThread Discussion (20%)**

The purpose of this assignment is to have you discover and then analyze current environmental chemistry issues in the world around us by discussing current news articles with your peers. This assignment consists of:

- **Creating and Posting** a VoiceThread about a current news article with your comment  
A posting schedule will be announced before the activity starts. Each student shall post their VTs no later than the listed date. Late penalty will be applied as a 10% mark deduction of the posting component per day for up to 48 hours beyond the original deadline. Posting made after **October 29, 11:55 pm** will not be accepted.
- **Replying** to classmates' posts. You shall make constructive feedback to a minimum of Five different VTs published within your VT group. Upload your feedback any time between September 22 and November 10. Reply made later than the cut-off date (**Nov 10, 11:55 pm**) will not be accepted.
- **Engaging** in small group discussions to gain deeper understanding of the subject. You will reach out to the members of your VT group to schedule a discussion. It can be done at a time mutually agreed upon by the members of your discussion group. This discussion content will be summarized as part of your final reflection report.
- **Synthesizing** your discussion experience of the entire activity by responding to a series of reflection questions. You will complete a reflection report (detailed instructions will be provided), and submit it to OWL Brightspace. The submission deadline is **November 29, 11:55 pm**.

**A No-Late-Penalty Period applies ONLY to the report submission.** Should extenuating circumstances arise, students do not need to request Academic Consideration and they are permitted to submit their reflection report up to 48 hours past the deadline without a late penalty. Should students submit their assessment beyond 48 hours past the deadline, a late penalty of 10% per day will be applied. Submission of reflection report later than **December 5, 11:55 pm** will not be accepted.

A detailed description of this assessment will be available on OWL Brightspace.

#### ❖ **Weekly quick quizzes (8%)**

The purpose of these quizzes is to serve as quick check points. They help you keep up with the pace of the course. There are typically ~1-3 questions per 1-hour lesson. The quiz questions will be posted weekly on OWL (typically on Mondays), and will only remain active for that week. It is not mandatory to answer all the questions, and only correct answers will be recorded as valid answers. At the end of the semester, the total # of valid (correct) answers will be counted, and the marks will be assigned based on the # of valid answers among the total # of quiz questions released throughout the semester. You will be marked following the scheme below:

$$N = \frac{\text{total valid answers provided}}{\text{total number of quiz questions}}$$

8 points:  $N \geq 80\%$

7 points:  $79\% \geq N \geq 70\%$

6 points:  $69\% \geq N \geq 60\%$

5 points:  $59\% \geq N \geq 50\%$

4 points:  $49\% \geq N \geq 40\%$

3 points:  $39\% \geq N \geq 30\%$

2 points:  $29\% \geq N > 0$

0 point:  $N = 0$

You may choose to skip this entire evaluation and have its weight transferred to the final exam. In this case, do not make any submission attempt.

However, if you made as few as one attempt at the quizzes, the marking rubric applies immediately, and no academic consideration will be accepted.

### ❖ **Group Interview (12%)**

At the end of each Theme, you will participate in a 15-minute in-person group interview with the instructor (held during office hours). Time slots will be available through an online booking system; you may choose the times that best fit your schedule. Each interview covers the content of one Theme. There are four interview opportunities in total. Each interview is worth **4%**, but you are required to complete **only three interviews** of your choice (total 12%).

If you miss one or more interviews, the weight of each missed interview will be automatically transferred to your final exam. If you choose not to participate in **any interviews**, the entire 12% will be transferred to your final exam.

#### **Grouping:**

- Interviews are designed to be completed in groups of 3–4 students. You are encouraged to choose your own group members.
- If you are unable to form a group, you must notify the instructor by the group formation deadline (September 15). The instructor will assist in placing you into an existing group.
- Individual interviews will only be permitted if no suitable group placement can be arranged. Time slots for individual interviews are limited and not guaranteed.

#### **References:**

- You may bring reference materials (printed or digital), but you may not read directly from a prepared script.
- References are intended only to assist your explanations.
- Please bring something to write with (pen and paper or a touchscreen device) in case you need to illustrate your answers.

#### **Interview Content:**

- All interviews use the same two core prompts:
  1. What content from this Theme did you understand best? Explain to demonstrate your understanding. (~5 min)
  2. What content from this Theme did you find confusing, and why? Present your specific questions. (~5 min)
- The instructor may ask brief, targeted follow-up questions based on your answers to clarify or probe your explanations. These follow-ups will remain within the scope of the current Theme and will emphasize reasoning and understanding. (~5 min)

#### **Participation & Marking:**

- All group members are expected to contribute to the discussion.

- If one member struggles, others may assist — but everyone should have an opportunity to speak.
- All members of the same group will receive the same mark for that interview.

#### **No-Show Policy**

- If you book an interview but do not attend, you will receive a **0** for that interview.
- If you are unable to attend with your group at the scheduled time, it is your responsibility to find another group to join.
- If your **entire group** needs to reschedule, you may do so through the online booking tool (rescheduling is subject to availability).

#### **Marking rubric (per interview, 4 marks total):**

- **Understanding & Accuracy (1.5 pt)** – Clear, correct explanations of concepts; demonstrates grasp of key ideas.
- **Reflection & Questioning (1.5 pt)** – Thoughtful identification of what was learned well and what remains unclear; ability to pose specific, meaningful questions.
- **Collaboration & Communication (1 pt)** – Balanced participation among group members; respectful and constructive discussion.

#### ❖ **Mid-term (24%) and Final Exam (36%)**

- **Two mid-term tests** are scheduled. The exact cut-off material of each mid-term will be announced in class and on OWL.  
Each mid-term test weighs 12% of the course total. There is no makeup test. Student who miss a midterm test and receive academic consideration will have the weight of the missed test transferred to the final exam.
- The **Final Exam** will be cumulative. Material covered on the mid-term test will be re-assessed on the final exam through similar questions. Details will be provided in late November.

When a student misses the Final Exam and their Academic Consideration has been granted, they will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under [Special Examinations](#)), especially for those who miss multiple final exams within one examination period.

## **6. Additional Statements**

### **6.1 Religious Accommodation**

When conflicts arise with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible, but not later than two weeks prior to the writing of the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays - <https://www.edi.uwo.ca>

## 6.2 Academic Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/Academic\\_Accommodation\\_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf).

## 6.3 General Academic Policies

The website for Registrar Services is <https://www.registrar.uwo.ca/>.

**Use of @uwo.ca email:** In accordance with policy, [https://www.uwo.ca/univsec/pdf/policies\\_procedures/section1/mapp113.pdf](https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf), the centrally administered e-mail account provided to students will be considered the individual's official university email address. It is the responsibility of the account holder to ensure that emails received from the University at their official university address are attended to in a timely manner.

**Requests for Relief** (formally known as "appeals")

Policy on Request for Relief from Academic Decision:

[https://uwo.ca/univsec//pdf/academic\\_policies/appeals/requests\\_for\\_relief\\_from\\_academic\\_decision\\_s.pdf](https://uwo.ca/univsec//pdf/academic_policies/appeals/requests_for_relief_from_academic_decision_s.pdf)

Procedures on Request for Relief from Academic Decision (Undergraduate):

[https://uwo.ca/univsec//pdf/academic\\_policies/appeals/undergrad\\_requests\\_for\\_relief\\_procedure.pdf](https://uwo.ca/univsec//pdf/academic_policies/appeals/undergrad_requests_for_relief_procedure.pdf)

## 6.4 Scholastic Offences

Policy on Scholastic Offences:

[https://uwo.ca/univsec//pdf/academic\\_policies/appeals/scholastic\\_offences.pdf](https://uwo.ca/univsec//pdf/academic_policies/appeals/scholastic_offences.pdf)

Procedures on Scholastic Offences (Undergraduate):

[https://uwo.ca/univsec//pdf/academic\\_policies/appeals/undergrad\\_scholastic\\_offence\\_procedure.pdf](https://uwo.ca/univsec//pdf/academic_policies/appeals/undergrad_scholastic_offence_procedure.pdf)

## Use of Electronic Devices During Assessments

In courses offered by the Faculty of Science, the possession of unauthorized electronic devices during any in-person assessment (such as tests, midterms, and final examinations) is strictly prohibited. This includes, but is not limited to: mobile phones, smart watches, smart glasses, and wireless earbuds or headphones.

Non-programmable calculators may be brought into the assessment room. It is your responsibility to review and comply with these expectations.

## 6.5 Support Services

Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, requests for relief, exam conflicts, and many other academic-related matters: <https://www.uwo.ca/sci/counselling/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence (GBSV) and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced GBSV (either recently or in the past), you will find information about support services for survivors, including emergency contacts at:

[https://www.uwo.ca/health/student\\_support/survivor\\_support/get-help.html](https://www.uwo.ca/health/student_support/survivor_support/get-help.html).

To connect with a case manager or set up an appointment, please contact [support@uwo.ca](mailto:support@uwo.ca).

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. If you have any questions regarding accommodations, you may also wish to contact Accessible Education at

[http://academic-support.uwo.ca/accessible\\_education/index.html](http://academic-support.uwo.ca/accessible_education/index.html)

Learning-skills counsellors at Learning Development and Success (<https://learning.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Additional student-run support services are offered by the USC, <https://westernusc.ca/services/>.